



Trends of area, production and productivity of Sesamum in Different districts of Chhattisgarh

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ABSTRACT

*The time trend analysis area of sesamum showed that the area under sesamum is positively and significantly increasing only in black soil of Bilaspur, ($R = 61^{**}$), Bastar ($R = 0.59^{**}$) and Raigarh ($R = 0.52^{**}$) districts having better moisture content. Whereas, it is decreasing in Raipur, ($R = 0.02$) Durg and ($R = 0.022$) Rajnandgaon ($R = 0.33$) districts, because of introduction of soybean in these districts. However, the decreasing trend in these districts is not significant. The production pattern of last 30 year of sesamum showed positive and significant increase in Raipur ($R = 0.64^{**}$), Durg ($R = 0.45^{*}$), Bilaspur, ($R = 0.62^{**}$), Bastar ($R = 0.65^{**}$), Raigarh ($R = 0.62^{**}$) and Surguja ($R = 0.77^{**}$) due to increasing productivity in these districts. The productivity of sesamum is positively and significantly increased in Raipur ($R = 0.80^{**}$), Durg ($R = 0.65^{**}$), Rajnandgaon ($R = 0.61^{**}$), Bilaspur ($R = 0.71^{**}$), Bastar ($R = 0.84^{**}$), Raigarh ($R = 0.75^{**}$) and Surguja ($R = 0.77^{**}$) districts due to motivating the farmer for use of improved and disease resistant varieties and adopting recommended agro-techniques.*

Keywords: Sesamum, kharif and rabi seasons, Trend analysis

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INTRODUCTION

India, with its rich agro-ecological diversity, is ideally suited for cultivation of nine annual oilseed crops, viz. groundnut, rapeseed-mustard, sunflower, sesamum, soybean, safflower, castor, linseed and niger, two perennial oilseed crops (coconut and oil palm) and around 100 tree species of forest origin that have the potential to yield about one million tonnes of vegetable oil.

India is the world's largest producer of castor, safflower, sesamum and niger. It ranks second in the production of groundnut and rapeseed, third in linseed and fifth in soybean and sunflower. India is the world's third largest producer of oilseeds with a record production of 25.14 million tonnes in 2003-04 but still India imports 5 millions tonnes of edible oil coasting over Rs. 9000 crores annually [1]. To keep pace with increasing demand there is an urgent need to boost up oilseed production in India.

Among major oilseed crop cultivated in Chhattisgarh, sesamum is an ancient crop in Chhattisgarh in respect to area, production and productivity of sesamum is 59.1 thousand ha., 23 thousand tonnes and 389 kg ha⁻¹, respectively. Sesamum is grown throughout the Chhattisgarh state in agro climatically diverse region.

MATERIALS AND METHODS

The present study was carried out in the state Chhattisgarh, which came in to existence on 1st Nov. 2000 as a result of bifurcation of M.P. state. It lies in eastern part of India and located between 17° 41' N and 24° 45' N latitude and 79° 30' E and 84° 15' E longitude. Orrisa surrounds it in the east in the west by M.P. and Maharashtra, in the north by U.P. and Jarkhand and in the south by Andhra Pradesh.

The study was carried out in 7 undivided districts of Chhattisgarh regions, which are:

S.No	Station	Latitude	Longitude
1	Raipur	21°14' N	81°39' E
2	Durg	21° 13' N	81° 17' E
3	Rajnandgaon	21° 05' N	81° 02' E
4	Bastar	19° 05' N	82° 02' E
5	Bilaspur	22° 05' N	82° 08' E
6	Raigarh	21° 55' N	83° 24' E
7	Surguja	23° 07' N	83° 12' E

The long term crop data in regard to area, production and productivity for groundnut sesames, linseed, rapeseed-mustard, soybean and total oilseeds that are grown during *kharif* and *rabi* seasons of different districts of Chhattisgarh were collected from the published records of department of Agriculture, Government of Madhya Pradesh, Bhopal and Government of Chhattisgarh, Raipur. Data were obtained for the period 1974-75 to 2003-04 and were used in present study.

Trend analysis

For temporal analysis of area, production and productivity of oilseeds crop in undivided districts of Chhattisgarh the time trend equations were constructed as:

$$Y = a + b X$$

Where,

Y = area, production, productivity

X = year

a = intercept

b = slope

The slope indicates the trend of area, production and productivity over the study period.

RESULT AND DISCUSSION

Area

In Raipur district, area has fluctuated considerably as shown in Fig. 1. The sesamum area in Raipur is marginally decreasing, though the later phase of study period is showing increasing trend. The highest area under sesamum cultivation was found in the year 2003-04 (9.7 thousand ha), whereas, lowest area was found in the year 1997-98 (5.2 thousand ha). The regression equation is $Y = -0.0034 X + 7.2434$ and R value is 0.02 which is non-significant.

In Durg district, trend in area is shown in Fig. 1. The production of sesamum is fluctuated during the study period and has a overall negative trend. The highest area of 0.9 thousand ha was found in year 1979-80 and lowest area was obtained 1991-92. The regression equation is $Y = -0.0445 X + 3.8903$ and R value is 0.22, which is non-significant.

The area of sesamum, in Rajnandgaon district has two trends. The area has decreased up to 1992-93 and after it is continuously increased is shown in Fig. 1. The highest area was found in the year 1992-93 (0.7 thousand ha) and lowest area was found in the year 1992- 93 (0.7 thousand ha). The regression equation $Y = -0.0604 X + 4.4129$ and R value is 0.33, which is non-significant.

In Bastar district, area of sesamum is increasing sharply from year 1999-2000 as shown in Fig. 1. The highest area was observed in the year 2003-04 (11.3 thousand ha), whereas, lowest area was observed in the year 1978-79 (1.7 thousand ha). The time trend regression equation is $Y = 0.1322 X + 1.1414$ and R value is 0.59, which is statistically highly significant at 1 % probability level.

The trend of area under sesamum in Bilaspur has shown little fluctuation until 1999-2000, area is considerably increasing since 2000-01 as given in Fig. 1. The highest area was found in the year 2002-03 (11.6 thousand ha) and lowest area was found in the year 1978-79 (1.7 thousand ha). The regression equation is $Y = 0.1442 X + 1.6571$ and R value is 0.61, which is statistically significant at 1 % probability level.

In Raigarh district, the area under sesamum has shown stagnation until 2001-02, but in last two years it has increased sharply as depicted in Fig. 1. The highest area was observed in the year 2002-03 (6.7 thousand ha), whereas, lowest area was observed in the year 1978-79 (2.3 thousand ha). The time trend regression equation is $Y = 0.0591 X + 2.2145$ and R value is 0.57, which is statistically highly significant at 1% probability level.

In Surguja district, the trend of area under sesamum fluctuated very much as shown in Fig. 1. The highest area was found in the year 2003-04 (10.4 thousand ha) and lowest area was found in the year 1979- 80

(2.5 thousand ha). The trend equation is $Y = 0.0984 X + 5.5285$ and R value is 0.52 which is highly significant at 1 % probability level.

The time trend analysis area of sesamum showed that the area under sesamum is positively and significantly increasing only in black soil of Bilaspur, (R = 61**), Bastar (R = 0.59**) and Raigarh (R = 0.52**) districts having better moisture content. Whereas, it is decreasing in Raipur, (R = 0.02) Durg and (R = 0.022) Rajnandgaon (R = 0.33) districts, because of introduction of soybean in these districts. However, the decreasing trend in these districts is not significant.

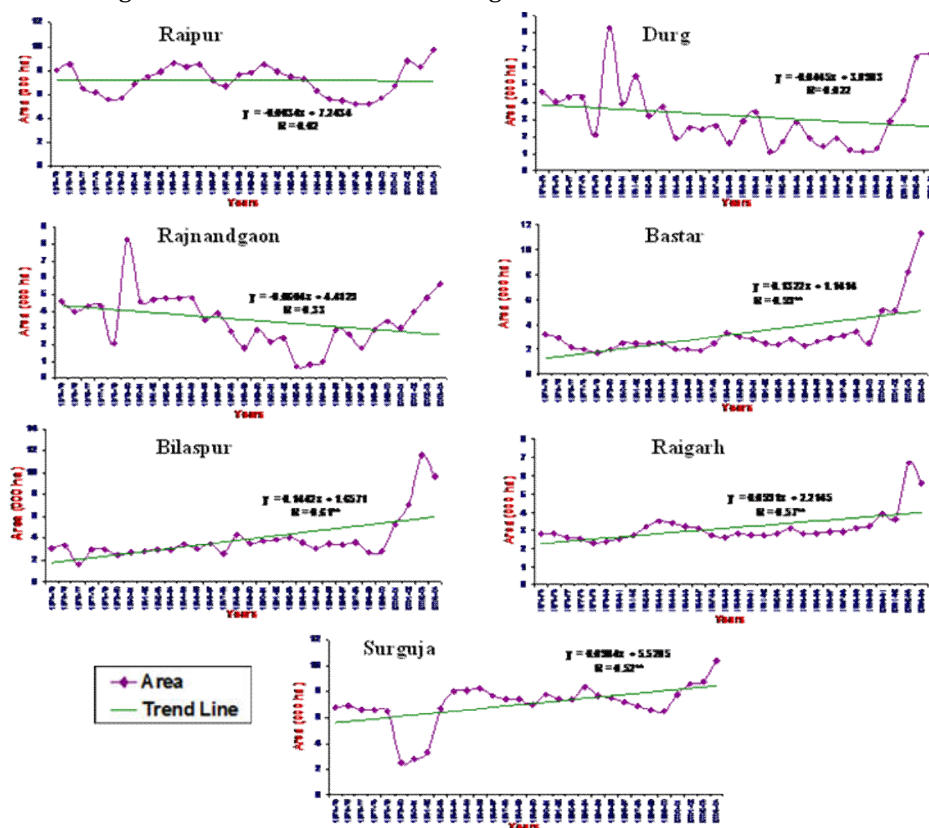


Fig. 1 : Trends of area of sesamum in different districts of Chhattisgarh

Production

The trend of production is increasing in Raipur as shown in Fig. 2 The highest production was found in the year 2003-04 (2.7 thousand tonnes). Whereas, the lowest production was found in the year 1979-80 (0.3 thousand tonnes). The regression equation is $Y = 0.0395 X + 0.5979$ and R value is 0.64, which is significant at 1 % probability level.

The trend of production has stagnated in Durg district however, it has shown sharp increase in last three years as shown in Fig. 2 The highest production was found in the year 2002-03 (3.9 thousand tonnes), whereas, lowest production found in the year 1997-98 (0.1 thousand tonnes). The regression equation is $Y = 0.0438 X - 0.0749$ and R value is 0.45, which is significant at 5 % probability level.

The production of sesamum has fluctuated largely in Rajnandgaon as shown in the Fig. 2. The highest production of 0.9 and lowest production of 0.1 found in the year 1983- 84, respectively. The time trend regression equation is $Y = 0.0025 X + 0.4407$ and R value is 0.11, which is non-significant.

The production pattern of different years of sesamum crop has witnessed stagnation in Bastar district until 1999-2000, after which it showed sharp increase as shown in Fig. 2. The highest production was found in the year 2003-04 (4.7 thousand tonnes) and lowest production was observed in the year from 1976- 77 to 1979- 80 (0.2 thousand tonnes). The regression equation is $Y = 0.0748 X - 0.3733$ and the R value is 0.65, which is statistically significant at 1% probability level.

The production of sesamum for different years in Bilaspur district, shown in Fig. 2. The production fluctuated during the study period but has shown increasing trend in last four year. The highest production was found in the year 2002-03 (3.0 thousand tonnes), whereas, lowest production was found in the year 1976-77 (0.1 thousand tonnes). The time trend equation is $Y = 0.0467 X - 0.0478$ and R value is 0.62, which is statistically significant at 1 % probability level.

In Raigarh district, the production under sesamum has stagnation is shown in Fig. 2. The highest production was found in the year 2003-04 (2.5 thousand tonnes) and lowest production was found in the

year 1980-81 (0.1 thousand tonnes). The regression equation is $Y = 0.038 X - 0.0083$ and R value is 0.62, which is statistically significant at 1 % probability level.

The production pattern of sesamum under Surguja district is shown in Fig. 2. The production has shown fluctuate during the study period, but is continuously increasing. The highest production was found in the year 2003- 04 (2.3 thousand tonnes), whereas, lowest area was observed in the year 1979- 80 (0.1 thousand tonnes). The regression equation is $Y = 0.0432 X + 0.3867$ and R value is 0.77, which is highly significant at 1 % probability level.

The production pattern of last 30 year of sesamum showed positive and significant increase in Raipur (R = 0.64**), Durg (R = 0.45*), Bilaspur, (R = 0.62**), Bastar (R = 0.65**), Raigarh (R = 0.62**) and Surguja (R = 0.77**) due to increasing productivity in these districts.

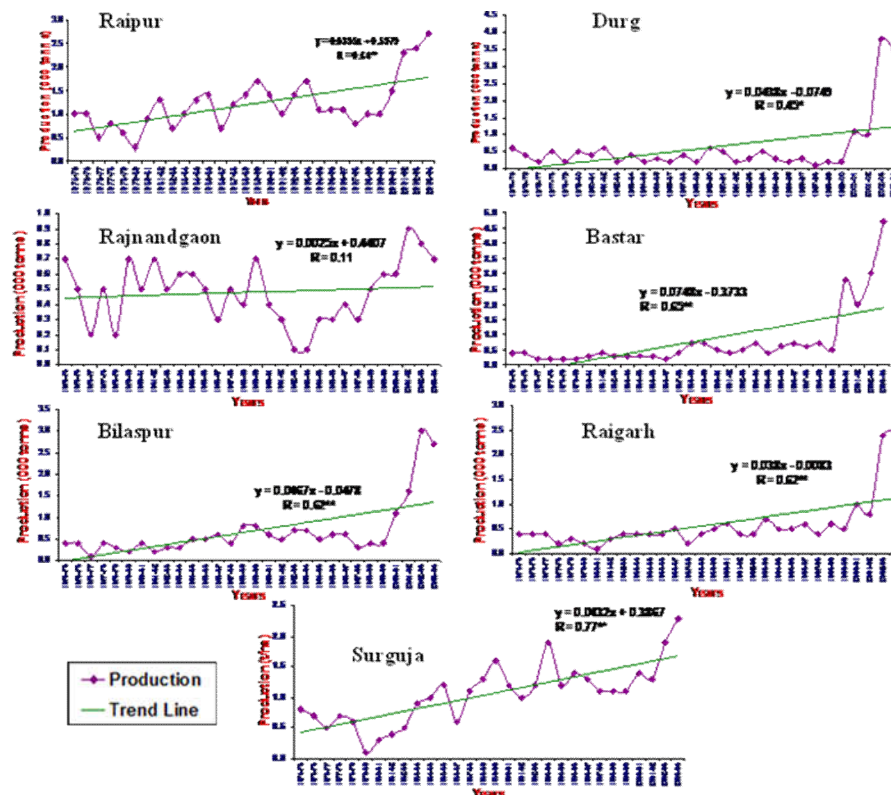


Fig. 2 : Trends of production of sesamum in different districts of Chhattisgarh

Productivity

The productivity of sesamum in Raipur district has consistently increasing as shown in Fig. 3. Highest productivity as found in the year 2001-02 (300 kg ha⁻¹), whereas, lowest productivity was found, in the year 1979-80 (40 kg ha⁻¹). The time trend regression equation is $Y = 5.5366 X + 82.149$ and R value is 0.80, which is statistically highly significant at 1 % probability level.

The Productivity of sesamum is increasing at slow rate during study period except in 2002-03, when quantum jump has been observed in Durg as shown in Fig. 3. The highest productivity of 576 kg/ha and lowest productivity of 42 kg/ha were observed in the years 2002-03 and 1976-77, respectively. The time trend regression equation is $Y = 7.5117 X + 39.469$ and the R value is 0.65, which is significant at 1 % probability level.

The productivity of sesamum in Rajnandgaon district shows increasing trend with large year-to-year as shown Fig. 3. The highest productivity was found in the year 1989-90 (240 kg/ha), whereas, lowest productivity was found in the year 1976-77 (44 kg/ha). The regression equation is $Y = 3.1539 X + 99.947$ and R value is 0.61, is which is significant at 1 % probability level.

The trend of productivity in Bastar district is shown in Fig. 3. The highest productivity was observed in the year 2003-04 (415 kg/ha) and the lowest productivity was observed in year 1976-77 (60 kg/ha). The regression equation is $Y = 8.2456X + 58.86$ and R value 0.84, which is significant at 1% probability level.

In Bilaspur district, productivity of sesamum has increased significantly as shown in Fig. 3. The highest productivity was found in the year 2003-04 (283 kg/ha), whereas, lowest productivity was observed in

the year 1979-80 (68 kg/ha). The regression equation is $Y = 4.176 X + 86.106$ and R value is 0.71, which is highly significant at 1 % probability level.

In Raigarh District, productivity of sesamum shows increasing trend as shown in Fig. 3. The highest productivity of 450 kg/ha and the lowest productivity of 55 kg/ha were found in the year 2003-04 and 1979-80, respectively. Regression equation is $Y = 6.7586 X + 62.841$ and R value is 0.75, which is highly significant at 1% probability level.

The productivity of sesamum increased significantly in Surguja district as shown in Fig. 3. The highest productivity of 247 kg/ha and the lowest productivity 45 kg/ha were observed in the year 2003-04 and 1979-80, respectively. The trend equation is $Y = 4.2638 X + 80.377$ and R value is 0.77 which, is highly significant at 1 % probability level.

The productivity of sesamum is positively and significantly increased in Raipur (R = 0.80**), Durg (R = 0.65**), Rajnandgaon (R = 0.61**), Bilaspur (R = 0.71**), Bastar (R = 0.84**), Raigarh (R = 0.75**) and Surguja (R = 0.77**) districts due to motivating the farmer for use of improved and disease resistant varieties and adopting recommended agro-techniques.

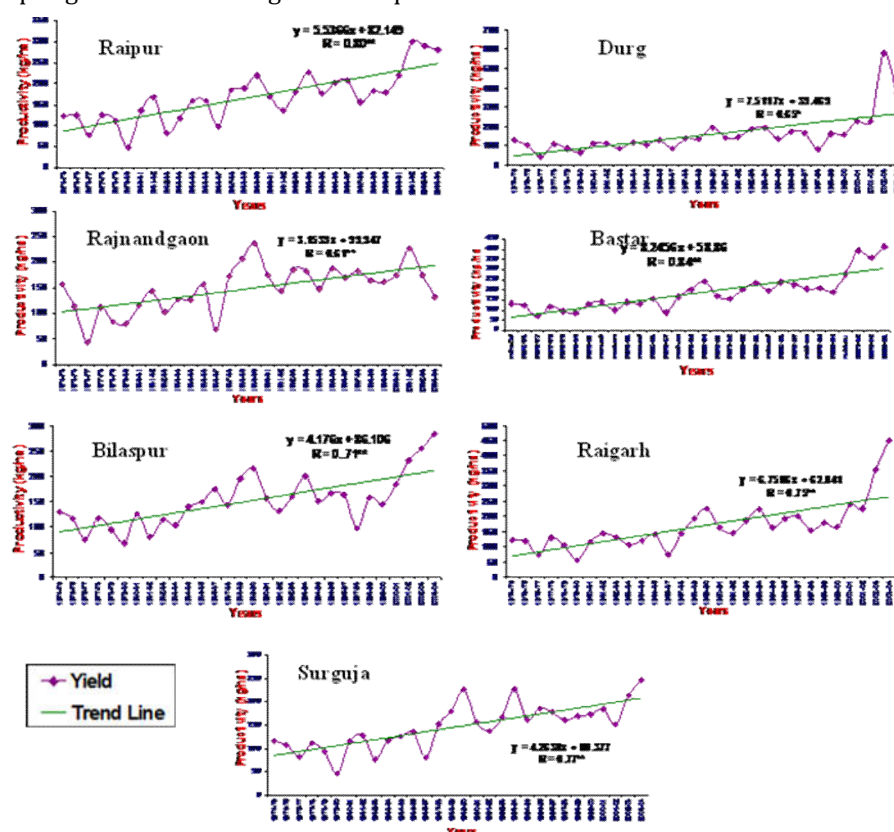


Fig. 3 : Trends of productivity of sesamum in different districts of Chhattisgarh

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